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Research Article

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Field evaluation of fungicides and botanicals against sheath blight, *Rhizoctonia solani* in rice (*Oryza sativa* L.)

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Summary

Out of eight fungicides and six neem based products, evaluated in field conditions, propiconazole 25 EC @ 0.1 per cent appeared to be most effective which reduced the disease severity by 86.0 per cent and 86.11 per cent and increased yield by 136.06 per cent and 137.20 per cent in *Kharif* 2001 and 2002, respectively. Among the six botanicals evaluated as field spray, Neem azal @ 0.3 per cent was found to be most effective and it reduced 79.07 and 80.0 per cent severity of disease and increased 102.07 per cent and 100.94 per cent crop yield in *Kharif* 2001 and 2002, respectively.

Key words : *Rhizoctonia solani* Kuhn., Sheath blight, Fungicides, Botanicals

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Introduction

Rice (*Oryza sativa* L.) is one of the most important cereal crop of the world. In India it occupies an area of 44.361 million hectares with production of 78.64 million tonnes, and productivity of 1.773 tonnes ha^{-1} (Mishra, 2004). It contributes 20.25 per cent of agricultural G.D.P.

This crop is subjected to attack by many diseases caused by fungi, bacteria, viruses, nematodes and several physiological disorders which caused annual loss to the tune of 12 to 25 per cent of the total production, while fungal diseases alone caused annual damage of 12 to 20 per cent of its production. Among these diseases, the sheath blight caused by *Rhizoctonia solani* Kuhn. earlier considered as minor disease is now regarded as an internationally important. In India, the disease was first reported by Paracer and Chahal in the year 1963 from Gurdaspur (Punjab). It is also designated as a banded blight disease of rice in North India. The pathogen mainly infect leaf sheath but symptoms may be produced on any aerial part of the rice plant.

Thus, sheath blight caused by *Rhizoctonia solani* Kuhn. is most economically important disease and have possessed challenge to the farmers for successful cultivation of rice and ultimately to the plant pathologists. Keeping this fact in view, evaluation of fungicides and botanicals against this pathogen were under taken in field conditions.

Resource and Research Methods

Eight fungicides and six neem based products were tested separately in two different sets of experiments against sheath blight to assess their efficacy. The field trials were conducted during *Kharif,* 2001 and 2002 crop

seasons in Randomized Block Design with four replications using Pusa Basmati-1 a highly susceptible cultivar. Eight different fungicides *viz.*, propiconazole 25 EC (0.1 %), carbendazim 50 WP (0.1 %), validamycin 3L (0.25 %), benomyl 50 WP (0.1 %), iprobenphos 48 EC (0.2 %), hexaconazole 5 SC (0.2 %), hexaconazole + captan 004-75 WP (0.1 %) and epoxyconazole + carbendazim 250 EC (0.2 %) were sprayed twice at 15 days interval and six neem based products like Achook (0.5 %), Neem gold (2 %), Neem azal (0.3 %), spictaf (0.45 %), tricure (0.5 %) and wanis (0.5 %) were sprayed thrice at 10 days interval starting from 30 days after transplanting. Control plots were sprayed with same volume of water. Disease severity was recorded using 0-9 SES scale. First observation on disease severity was recorded before the beginning of first spray of fungicides and neem based products. Subsequent observations were recorded before each spray and finally disease severity was recorded 15 days after last spray.

Research Findings and Discussion

The present studies showed that two foliar sprays of propiconazole 25 EC (0.1 %) at 15 days interval were found most effective in reducing disease severity of sheath blight and increasing grain yield followed by carbendazim 50 WP (0.1%), Iprobenphos 48 EC (0.1%) and hexaconazole 5 SC (0.2%). However, validamycin

Table 1: Effect of fungicides on sheath blight and grain yield of rice in field condition

Sr. No.	Treatments	Concentration (%)	*Kharif*, 2001				*Kharif*, 2002			
			Disease severity• (%)	Per cent disease control	Grain yield kg/ha	Per cent increase yield	Disease severity• (%)	Per cent disease control	Grain yield kg/ha	Per cent increase yield
1.	Propiconazole 25EC	0.10	7.00 (15.34)	86.00	4013	136.06	7.50 (15.89)	86.11	3985	137.20
2.	Carbendazim 50 wp	0.10	7.67 (16.08)	84.66	3990	134.71	8.00 (16.43)	85.18	3669	136.25
3.	Validamycin 3L	0.25	10.50 (18.91)	79.00	3810	124.12	11.00 (19.37)	79.63	3804	126.43
4.	Benomyl 50 WP	0.10	10.00 (18.43)	80.00	3840	125.88	11.00 (19.37)	79.63	3800	126.19
5.	Iprobenphos 48 EC	0.20	8.33 (16.78)	83.33	3955	132.65	8.67 (17.12)	83.94	3939	134.46
6.	Hexaconazole 5 SC	0.20	8.00 (16.43)	84.00	3970	133.53	8.33 (16.76)	84.57	3954	135.36
7.	Hexaconazole + captan 004-75WP	0.10	9.00 (17.46)	82.00	3914	130.24	9.50 (17.95)	82.41	3875	130.65
8.	Epoxyconazole + carbendazim 250 EC	0.20	9.00 (17.46)	82.60	3920	130.59	9.00 (17.46)	83.33	3918	133.21
9.	Control	Water	50.00 (45.00)	-	1700	-	54.00 (47.29)	-	1680	-
	S.E. ±		0.64		5.10		0.63		4.90	
	C.D. (P=0.05)		1.80		15.43		1.95		14.60	

•Figures given in parenthesis are Angular transformed values

Table 2 : Effect of botanicals on sheath blight and grain yield of rice in field condition

Sr. No.	Treatments	Concentration (%)	*Kharif* 2001				*Kharif* 2002			
			Disease severity• (%)	Per cent disease control	Grain yield kg/ha	Per cent increase yield	Disease severity• (%)	Per cent disease control	Grain yield kg/ha	Per cent increase yield
1.	Achook	0.50	21.00 (27.27)	61.82	2673	78.20	22.00 (27.97)	63.33	2624	76.37
2.	Neem gold	2.00	11.75 (20.05)	78.64	3005	100.33	12.33 (20.56)	79.45	2973	99.80
3.	Neem azal	0.30	11.50 (19.82)	79.07	3031	102.07	12.00 (20.27)	80.00	2990	100.94
4.	Spictaf	0.45	25.00 (30.00)	54.55	2410	60.67	27.00 (31.31)	55.00	2320	55.91
5.	Wanis	0.50	28.33 (32.16)	48.49	2198	46.53	30.00 (33.21)	50.00	2114	42.07
6.	Tricure	0.50	28.67 (32.37)	47.87	2120	41.33	30.50 (33.52)	49.17	2035	36.76
7.	Bavistin 50 WP	0.10	9.00 (17.46)	83.63	3940	162.67	9.33 (17.76)	84.45	3925	163.76
8.	Control	Water	55.00 (47.87)	-	1500	-	60.00 (50.77)	-	1488	-
	S.E. ±		0.49		4.11		0.50		4.21	
	C.D. (P=0.05)		1.49		12.46		1.50		12.76	

•Figures given in parenthesis are Angular transformed values

3 L (0.25%) was found least effective fungicides with lowest yield in both the years (Table 1). Jones *et al.* (1987) have also reported that propiconazole applied twice or propiconazole followed by benomyl application significantly reduced disease severity and increased yield. Mishra *et al.* (1989) and Groth and Rush (1988) who reported propiconazole most effective against sheath blight of rice which increased the grain yield followed by benomyl. Upmanyu *et al.* (2002) have also reported the effectiveness of carbendazim (0.1%) and tebuconazole (0.05%) in reducing the web blight severity caused by *R. solani* and also enhanced the yield in French bean. Similarly Abhimanyu and Singh (2002) found the propiconazole to be most effective in reducing disease severity up to 28.3 – 29.1 per cent and thereby increasing the yield when used as seed dresser and sprayed twice at 15 days interval against *T. cucumeris* causing web blight of groundnut. Ahmad *et al.* (1988) and Chahal *et al.* (2003) also noticed the effectiveness of propiconazole against sheath blight which increased yield and reduced disease severity of rice. Thus, the results of present study are inconformity with the results of the earlier workers.

Out of six Neem based botanicals evaluated in field conditions, the data given in Table 2 revealed that three foliar sprays of Neem azal (0.3%) at 10 days interval were found most effective which reduced disease severity and increased crop yield followed by Neem gold (2%). However, tricure (0.5%) was found to be least effective botanical in both the years as lowest disease reduction and grain yield both were exhibited by the said chemical. While judging relative efficacy, it was found that fungicides (Carbendazim 50 WP @ 0.1%) was more effective than botanicals as carbendazim reduced disease severity and increase of yield in both (*Kharif*, 2001 and 2002) crop seasons. Lakshmanan *et al.* (1990) also reported effectiveness of leaf extracts of *Azadirachta indica* against *R. solani*. Mishra and Tiwari (1990) observed the toxicity of neem leaf extract along with the leaf extract of *Calotropis prosera* and *Datura stramonium* against *Pyricularia oryzae* and *Rhizoctonia solani.* Singh *et al.* (2002) reported that Achook (5 lit/ha), Neem Azal T/S (3 lit/ha), Neem gold (20 lit/ha), spictaf (4.5 lit/ha), tricure (5 lit/ha) and wanis (5 lit/ha) effectively controled the sheath blight of rice and increased yield in scented rice, Pusa Basmati-1. Similar observations have also been made by Murlidharan *et al.* (2003) who found that Neem products showed presence of an array of complex compound known as triterpenoids or more specifically linnoids responsible for reduction in disease severity and increase in grain yield.

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